

Southwest view of the perimeter road

5.1 INTRODUCTION

The airside and landside facilities that are needed to satisfy projected aviation demand through the planning period were identified in the previous chapter. The next step in the master planning process is to evaluate the various ways those facilities can be provided. In this chapter, the overall objective is to produce a balanced airside and landside complex to serve forecast aviation demands.

Yavapai County owns, operates, and manages the development of Bagdad Airport. It is the responsibility of the County to develop and operate the airport to the betterment for the Town of Bagdad. This responsibility is best served when the County focuses on the following objectives:

- Operate the airport as an efficient, safe, and environmentally compatible facility.
- Consider the needs of the neighboring community and existing transportation systems through representatives of the Planning Advisory Committee (PAC) and the public.
- Design a developmental program that provides the means for Bagdad Airport to continue its role as part of a highly integrated transportation system that enables planes and people to move safely and efficiently throughout the state and the country.

This Master Plan used a working paper process whereby all participants were given the opportunity to review critical elements of the plan as each was developed and to outline concerns and direction for the next element of work.

The alternative concepts presented on the following pages are briefly evaluated on their ability to meet the projected aviation demand in terms of aviation, engineering, and environmental factors. The alternatives go beyond consideration of development for the existing airport site by addressing alternatives of "No Development" and "Development of Other Sites." The four alternatives with brief comment on each follow:

- "NO DEVELOPMENT"
- DEVELOPMENT OF OTHER SITES
- DEVELOP A NEW AIRPORT
- DEVELOP EXISTING AIRPORT

With this information, as well as the input and direction of the Planning Advisory Committee, a final airport development concept evolved. The final airport concept was then refined into a realistic and achievable development program.

5.2 GENERAL AIRPORT SITE ALTERNATIVES

5.2.1 "No Development"

When analyzing and comparing the costs and benefits of various development alternatives, it is important to consider the consequences of no future development at the airport. This alternative implies that Bagdad Airport will be maintained in its present condition without future improvements.

The existing conditions at the airport --- lack of services and facilities, and deteriorating airfield pavement --- discourage potential airport users from locating at or operating from the airport. For this alternative, facilities would remain "as is" and eventually become unserviceable due to deterioration. Substandard airfield conditions would remain. Even with a minimal maintenance program, the "No Development" alternative would restrict the airport's ability to conduct safe aircraft operations. This alternative is not recommended. However, the advantage of this alternative is that no additional capital outlays would be needed.

5.2.2 Development of Other Sites

Existing airports within the Bagdad Area have been examined for their ability to accommodate Bagdad's forecast demand. The examination included such factors as physical expansion potential limitations, local growth trends, convenience and political climate.

The Bagdad Airport provides facilities during firefighting season, touch-and-go training for student pilots and other general aviation activity. Displacement of this aviation demand would most likely require that Prescott Love Field located approximately 38 nautical miles east and Wickenburg located 42 nautical miles south, accommodate this demand. While Bagdad's aviation demand is low compared to other GA airport activity levels in the region, any displaced demand dictates that the receiving airport(s) adapt and/or expand facilities. This may include addressing compatibility problems between displaced and existing users and operations. In the best interest of the regional airport system, this alternative is not recommended.

5.2.3 Develop A New Airport

Development of an airport at a new site is even more difficult than attempting to expand an existing facility. There have been very few new airports developed throughout the U.S. over the last two decades. The time factors associated with developing a new airport nearly prohibits some programs from ever realizing anything beyond conceptual plans since the required land is usually lost to other immediate development needs. Although major expansion programs at the existing Bagdad Airport are not deemed necessary or probable, even less viable is the development of an airport at a new site.

In addition, there is a considerable investment in Bagdad Airport and any financial commitment to move the facility would be a burden. Moreover, the development process of a new airport is relatively time-consuming, complex and controversial to warrant much hope for success. Therefore, this alternative is also not recommended.

5.2.4 Develop Existing Airport

As discussed in the previous chapters, the aviation demand for Bagdad Airport can be accommodated at the existing site beyond 2017 with proper airfield maintenance, construction of a terminal building, additional aircraft parking and the upgrade of current utilities.

Development of the existing Bagdad Airport offers several cost-saving advantages. Most importantly, a substantial public investment has already been made in support of the existing airport. If the airport is relocated or demand displaced to other airports, this investment would be lost. Protection of this investment can result in savings for future development. Further, the Bagdad Airport has a cooperative and willing sponsor, which fully supports the future development of the airport. This is the preferred airport development alternative.

5.3 EXISTING BAGDAD AIRPORT DEVELOPMENT ALTERNATIVES

Airport development alternatives typically focus on airside and landside development possibilities. For Bagdad, the recommended airside development items are limited to the runway and taxiway system. Further, the recommended landside improvements for Bagdad can be integrated with any of the airside improvements.

5.3.1 Airside Alternatives

Airside facilities, by their very nature, are the focal point of the airport system. Because of their role as the point of transition between air operations and ground operations, airside facilities are the most critical factors in the identification of reasonable airport development alternatives.

The development of airside alternatives examined various ways that the existing facilities could provide the maximum utilization within reasonable topographic, engineering, environmental, and development cost constraints.

Identification of Preliminary Development Concepts

Bagdad Airport requires relatively few airside improvements in order to meet the recommended design configuration. Given the existing runway system, three preliminary airfield development concepts were identified:

- Construct a new crosswind runway with dimensions of 4,200 feet by 60 feet.
- Construct a full-length taxiway to conform to FAA design standards.
- Continue to use existing Runway 05-23 alignment and establish a runway maintenance program.

Evaluation of Development Concepts

Evaluation of the three preliminary development concepts was undertaken to assess whether there were any "fatal flaws" that would eliminate a development concept from further study.

While the first two concepts (construct crosswind runway and full length parallel taxiway to Runway 5-23) were considered feasible, these concepts were dismissed immediately for three key reasons (fatal flaws):

- 1) Both projects are cost prohibitive based on low usage. The Airport understands that the low usage makes it difficult to obtain funding for crosswind runway and taxiway projects based on the high cost and low benefit. Further, County funds for the airport are quite limited.
- 2) Both projects eliminate and/or constrain landside expansion capability.
- 3) Both projects require additional land acquisition.

Refinement of Development Concepts

At this point in the analysis, the remaining development concept (continued use of Runway 5-23 with runway maintenance program) was refined and identified as Alternative I, "Existing Runway Maintenance." The alternative was then further refined and divided into more specific alternatives identified as IA, IB and IC. These alternatives are described here.

IA) Resurface the current Runway 5-23 including taxiway exits and aprons with slurry seal and crack filler, maintaining the existing LIRL and Threshold Lighting Systems.

IB) Reconstruct runway edges due to severe deterioration and overlay the runway, taxiway exits and aprons with two inches of asphalt concrete.

IC) Reconstruct the runway to FAA design standards by paving a portion to correct profile and overlay as required. Upgrade the lighting system to a Medium Intensity Runway Edge Lighting (MIRL) system and add Runway End Identifier Lights (REILs) at Runway 23 end.

Since these alternatives are maintenance-oriented, no graphic illustration is provided.

ALTERNATIVE IA (MINIMAL IMPROVEMENTS) examined rehabilitation of the existing runway conditions and replacing runway and threshold lights that are not operational. Additional taxiway and apron markings would be included.

Alternative IA Evaluation

As completed in 1990, resurfacing and sealing the existing Runway 5-23 would not require extraordinary measures in order for the runway to be improved. If the project is repeated as before, this alternative would require approximately 39,000 square yards of asphalt slurry seal to resurface the runway, taxiway exits and both aprons.

This project would also include repainting markings on all required areas, including both aircraft parking aprons. In most cases, the resurfacing needs to be repeated every 2-3 years to keep cracking and damage to a minimum.

Resurfacing of the runway system, as previously done in 1990, would maintain the runway, taxiway exits, and aprons. However, the runway edges have shown severe deterioration. A slurry seal would not fully repair the damage nor prevent further transverse cracking damage from occurring.

Although the existing LIRL system is not FAA standard, they are functional. The threshold lights located at Runway 23 end are also functional. However, both systems are missing several lights. To continue the use of these lighting systems, the replacement of missing lights and continued maintenance would be the simplest solution. The painting of the airfield edge markings for the taxiway exits and aprons are requirements that have to be met with all three alternatives.

This Alternative is the least costly (approximately \$150,000) and produces the least disruption to airport operations in terms of time and coordination of resurfacing and painting sections of the airfield areas. However, the resurfacing may not be as effective in maintaining the airfield areas to FAA standards. Further, this approach has a shorter life span in wear.

ALTERNATIVE IB examined reconstruction of the Runway edges, due to severe damage and overlaying the remaining runway, taxiway exits, and aprons with two inches of asphalt concrete for a longer life span. The LIRL system would be replaced with a FAA standard MIRL system and missing runway threshold lights would be replaced. Runway, taxiway, and apron markings would be included.

Alternative IB Evaluation

The reconstruction of the runway edges of the existing runway and a two-inch asphalt overlay for the remaining runway, taxiway exits and aprons would correct the problem with possible sub-grade deterioration and extensive cracking. This would prolong the existing pavement life of the taxiway exits and aprons for about 5-10 years. Along with repainting the airfield facilities, this alternative would mitigate the current airfield deterioration problem and ultimately improve the safety of operations at Bagdad Airport. Although the cost would be more than Alternative IA, the increased life span would produce less disruption to airport operations. The approximate cost for this alternative is \$200,000.

It is critical that aircraft safety be in the forefront of any improvements at Bagdad Airport. The lighting system would also be upgraded to the FAA standard MIRL system. Further, nighttime operations at Bagdad Airport would be significantly improved.

As part of this alternative, the current threshold lights would remain and missing lights would be replaced. The system would continue to be radio-controlled, which minimizes cost and enables the airport to operate without staffing. A maintenance program would have to be established to assure that the lighting system is maintained.

ALTERNATIVE IC (BASED ON RUNWAY PROFILE NOT MEETING FAA 2% PROFILE CRITERIA) consists of the following:

- Reconstruction of the current runway to the newly established profile
- Resurfacing the connecting taxiway exits along with the two aprons
- Replacing the LIRL system with a MIRL system
- Adding a REIL system on Runway 23 end and replacing missing threshold lights at both runway ends

- Restriping/adding runway, taxiway and apron markings
- Evaluating potential GPS system to establish navigational aid at Bagdad Airport

Alternative 1C Evaluation

While similar to the previous alternatives, the main purpose of this alternative is to bring Runway 5-23 up to FAA Design Standards and provide a long-term solution for the deterioration of the runway. The existing taxiway exits and aprons would be reconstructed and painted as discussed in Alternative IB.

The proposed Alternative IC would require an estimated construction cost of slightly more than \$250,000 (not including a GPS system). Although this alternative would entail more extensive project coordination and scheduling, its disruption to airport operations is not significantly greater than the disruption encountered with the proposed Alternatives IA and IB.

Similar to Alternative IB, the existing lighting system would be completely replaced by a more current FAA-approved standard lighting system for the type of operations occurring at Bagdad Airport. The Medium Intensity Runway Lighting (MIRL) system, recommended for all visual and non-precision runways intended to be used at night or during low light or visibility conditions, will replace the current LIRL system.

Reflective markers at taxiway exits will improve the safety of nighttime aircraft movements on the airport and help eliminate inadvertent taxiing off of paved surfaces. As discussed in Alternative IB, the current threshold lights at both runway ends would be maintained and new Runway End Identifier Lights (REILs) installed at Runway 23 end.

To relieve the intermittent navigation signals and enhance the safety of aircraft operations at Bagdad Airport, a GPS system is recommended. A complete cost and requirement evaluation for establishing a GPS system would have to be undertaken.

While the cost factors associated with Alternative IC are less favorable, the County and the PAC recognize that the long-term advantages more than compensate for the initial cost outlays. The improved safety alone justifies the upgrades in lighting, as well as the partial reconstruction of the runway system.

Airside Evaluation Conclusions and Preferred Airside Development

Based on the evaluation process and PAC conclusions, the following represents the preferred airside development alternative for the existing Bagdad Airport.

Preferred Airside Development (Alternative IC) includes:

- ◆ Reconstruct the runway up to standards
- ◆ Overlay the remaining runway, taxiway exits and aprons
- ◆ Expand the main apron area to the west (2 aircraft spaces)
- ◆ Upgrade to MIRL system
- ◆ Maintain threshold lights and addition of REIL system at 23 end
- ◆ Evaluate potential GPS system

Proposed development can be achieved in stages with minimal interruptions to airport operations. Based on PAC input, there are no plans for additional runway and/or taxiway construction during the planning period.

5.3.2 Landside Alternatives

Landside facilities include terminal facilities, utilities, fencing, hangars, aircraft parking apron, auto parking, and fuel storage. As presented in Chapter 4, Bagdad Airport has adequate hangar and auto parking to accommodate aviation demand through the year 2017. However, a small Terminal Building and two additional aircraft spaces to meet the increasing demand of itinerant operations are needed. In addition, utility infrastructure, security fencing, and drainage improvements also require consideration.

Identification of Preliminary Development Concepts

The landside alternatives addressed the terminal area, aircraft parking and other facility needs, to include:

- Installation of telephone lines to the north side of the airport
- Installation of a portable sewage system
- Evaluation of additional culverts for drainage to prevent ponding
- Relocation of fencing approximately 139 feet on Runway 23 end and 304 feet at Runway 03 end
- Upgrading to game fencing with warning signs and additional signage located in town

In order to centralize landside development, two development areas were considered for a new terminal building. These two areas (see **Exhibit 5-1**) were identified as preliminary development concepts for landside facilities to include:

- ➔ Terminal Building development to the north of the existing main hangar
 - ➔ Terminal Building development at present trailer location between the two aprons and hangar areas

Since the landside requirement for aircraft parking warrants only two additional spaces within the planning period, public apron expansion to the west (shown in Exhibit 5-1) was the most logical and least intrusive design. With the PAC's concurrence, no other locations were identified for these two aircraft apron parking spaces.

Remaining improvements proposed are not presented as alternatives, but rather as additional projects. Utilities, drainage and fencing improvements are included. The utilities at Bagdad Airport would also have to be considered and upgraded to accommodate a new terminal area. Basic needs such as electrical conduits, telephone lines, water, and sewer systems will be installed. In addition, an evaluation of existing electrical capabilities needs to be addressed prior to upgrades in lighting systems and additional landside facilities.

The drainage system improvements would most likely be included in airfield improvement projects for the runway, taxiway exits and aprons.

The relocation of the property fence by an additional 139 feet from Runway 23 end and 304 feet from Runway 03 end is needed to eliminate runway approach surface penetrations.

In addition, the existing fence should be replaced with game fencing to prevent human and animal airfield incursions. The recurring problem of vandalism and trespassing can also be addressed by installing warning signs throughout the property and boundary fencing. Because of the airport's secluded location with regard to the Town of Bagdad, additional signage in Town would help guide traffic directly to the airport.

Preliminary Evaluation of the Terminal Building Concepts

Both the center and the north side location for the Terminal Building have ample space for development behind the building restriction line. The north side has primary runway frontage with better access to the existing apron than the center location. However, development at the center location would also be adjacent to both hangar facilities and auto parking areas, but away from the main apron area.

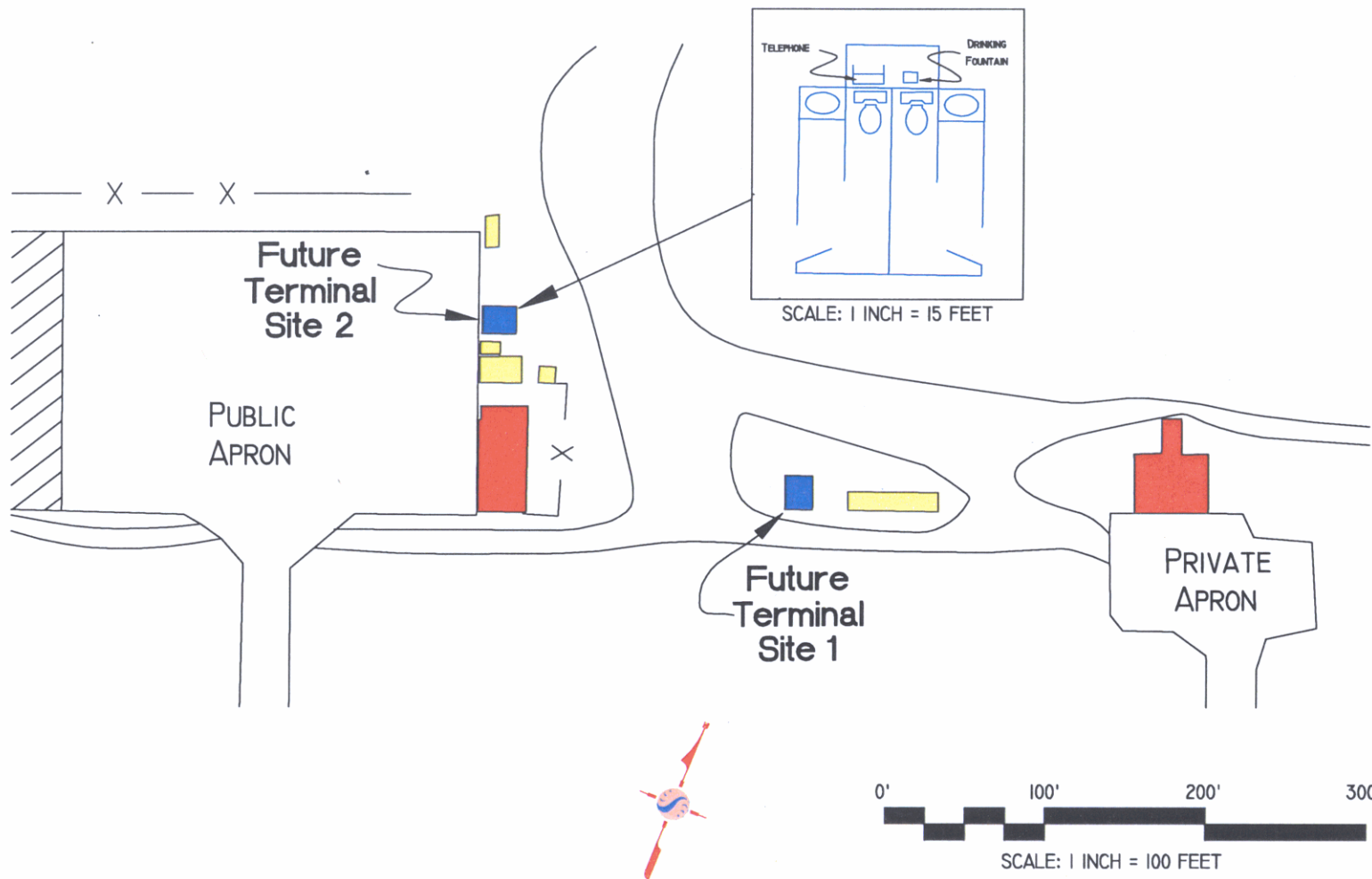
While there is room for terminal expansion in the center location, it does not offer the optimal arrangement that the north side offers. Therefore, the center location development concept was eliminated from further study. All utility, security and drainage improvements are included in this development concept.

With the elimination of one of the two development concepts, one remained for further consideration and refinement.

Evaluation Conclusions and Preferred Landside Development

Based on the evaluation process and PAC conclusions, the preferred landside development includes:

- Construction of a 200 square-foot Terminal Building with a single restroom, telephone, water fountain and additional space for storage that may keep the existing hangars free for aircraft parking use.
- Expansion of the main apron to the west to accommodate the additional two aircraft parking spaces.
- Installation of a portable sewage system, telephone lines, water connections, and improve proper electrical lines.
- Fencing relocation; upgrade to wildlife fencing.
- Installation of warning signs for airport security and directional signs in town.



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Existing Facilities
 Hangars
 Buildings

Future Facilities
 Future Terminal
 Future Apron Expansion

Client/Project
 YAVAPAI COUNTY
 BAGDAD AIRPORT
 MASTER PLAN UPDATE
 EXHIBIT 5-1
**Terminal Building
 Site Alternatives**

This development will be combined with the preferred airside development alternative and reflected on the Airport Layout Plan. No additional landside development is proposed or considered economically feasible and complementary to the existing airside configuration.

5.4 PREFERRED LAND USE DEVELOPMENT

The airport master plan addresses specific airport improvement needs required during the 20-year planning window. However, planning for development beyond these needs is important since airport improvements seek to serve the community well beyond 20 years. Further, it is recognized that development plans should be flexible and responsive to changing conditions. For Bagdad, a preferred land use development plan has been established to address this need. **Exhibit 5-2** provides an overview of the preferred land use development plan for Bagdad that was derived from input and coordination with the PAC during the alternatives analysis process. Land uses shown provide for a distinct separation of airport functions if additional development needs are realized.

5.5 SUMMARY

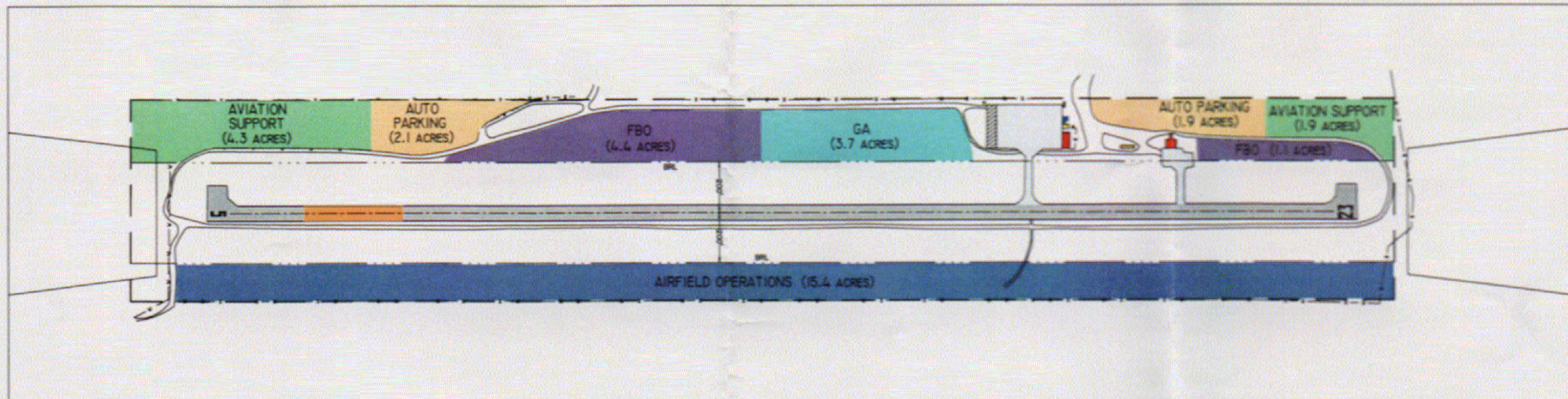
The recommendations contained in this chapter for the airside and landside development are graphically illustrated and presented in Chapter 7, Airport Plans. The Airport Layout Plan (ALP) illustrates the ultimate development of the Bagdad Airport. A brief summary of the improvement projects are listed here:

The preferred **AIRSIDE DEVELOPMENT** includes the following:

- ➔ Maintain Runway 5-23 at its current dimensions of 4,575 feet by 60 feet, serving 75 percent of the small B-I aircraft fleet
- ➔ Reconstruct the runway up to standards
- ➔ Overlay the remaining runway, taxiway exits and aprons
- ➔ Upgrade to MIRL system
- ➔ Maintain threshold lights and addition of REIL system at 23 end
- ➔ Evaluate potential GPS system

The preferred **LANDSIDE DEVELOPMENT** includes the following:

- ➔ Construct 200 square-foot Terminal Building with a single restroom, telephone, water fountain and additional space for storage that may keep the existing hangars free for aircraft parking use
- ➔ Expand the main apron to the west for 2 additional aircraft parking spaces
- ➔ Improve utilities to include:
 - Upgrade and install proper electrical lines
 - Install portable sewage system
 - Route telephone lines
 - Install water pipe connections
 - Relocate and upgrade to game fencing
 - Post warning signs and additional directional signs in Town



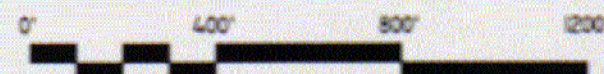
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Existing Facilities

- Hangars
- Buildings
- Maintenance Program
- Apron Overlay
- Runway Overlay
- Runway Reconstruction
- Runway Edge Improvement

Future Facility/Land Use

- Future Terminal
- Future FBO Area
- Future General Aviation Area
- Future Aviation Support Area
- Future Auto Parking Area
- Future Airfield Operation Area
- Future Apron Expansion



SCALE: 1 INCH = 400 FEET

Client/Project
YAVAPAI COUNTY
BAGDAD AIRPORT
MASTER PLAN UPDATE

EXHIBIT 5-2
**Preferred Land Use
Development**